TI:

Solid State Power Supplies

Unclassified

Safety & Environmental Impact is “LOW”

TI: Solid State Power Supplies

Terminal Learning Objective

ACTION:

Given schematic diagrams answer questions pertinent to operation & characteristics of Power Supplies, Bridge Rectifier or Voltage Doublers..

CONDITIONS:

Without reference.

STANDARD:

7 correct answers out of 10 Questions.

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Introduction

Power Supplies have been introduced in a previous lesson. This lesson will review those concepts and the Bridge Rectifier & the Voltage Doubler.

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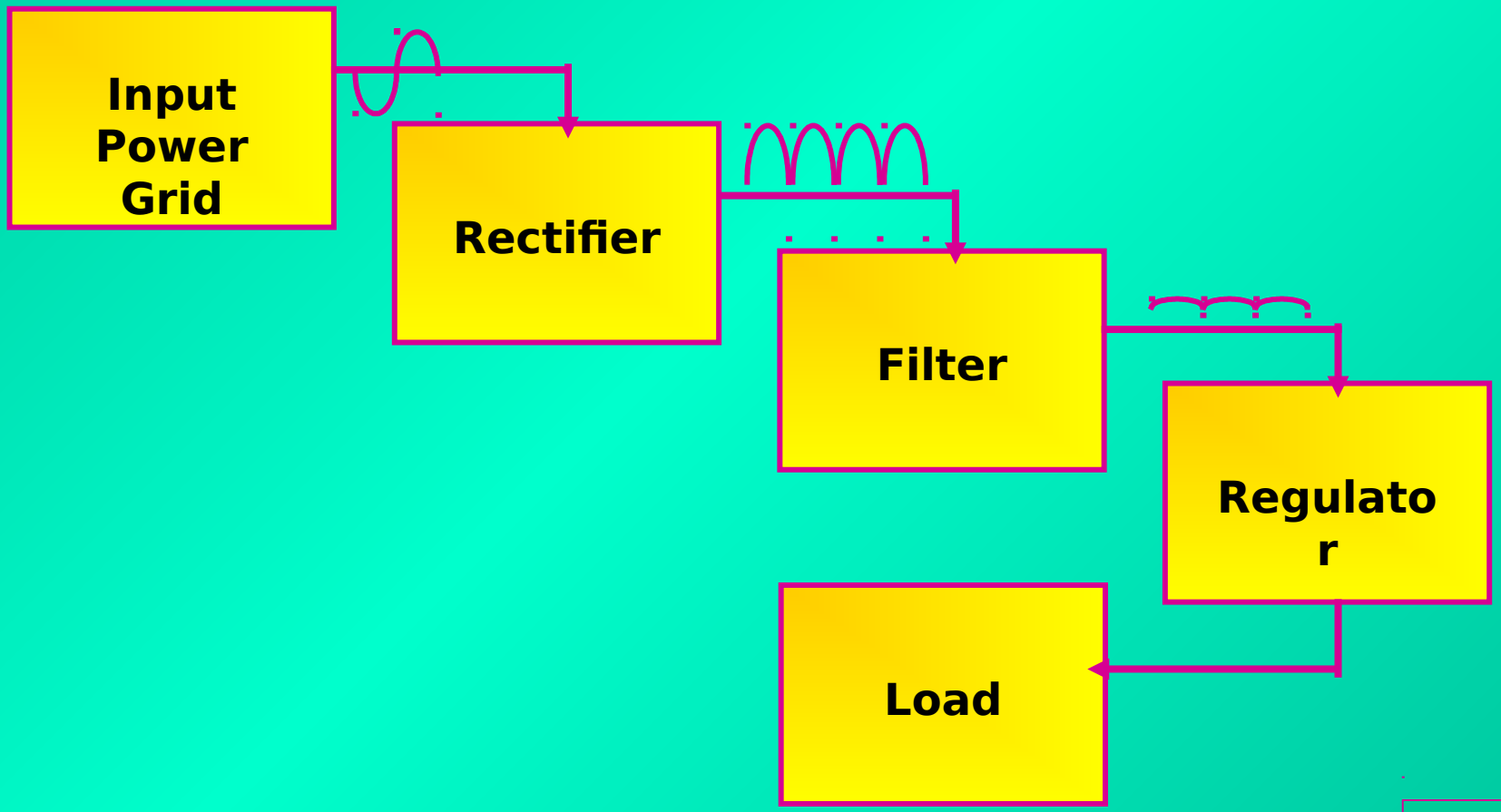
Power Supply Block Diagram;



Transformer

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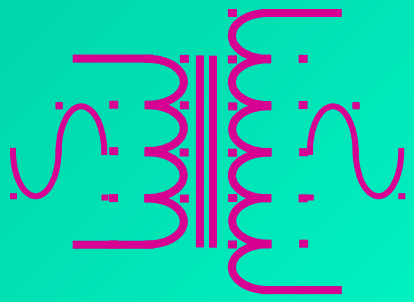
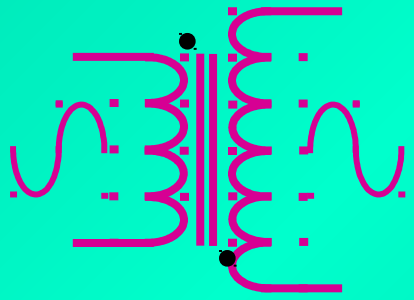
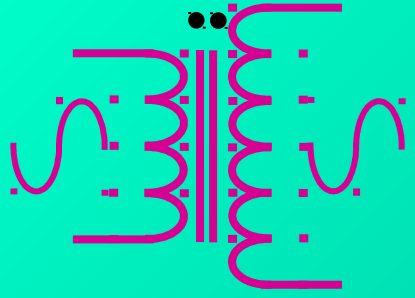
Transformer; Phase, Step-up, Step-down & Turns Ratio.



180° Out of Phase

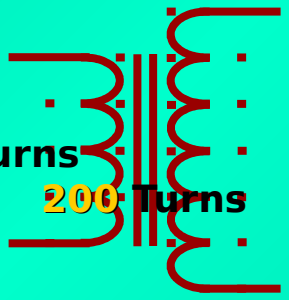


180° Out of Phase



In Phase

1 : 2

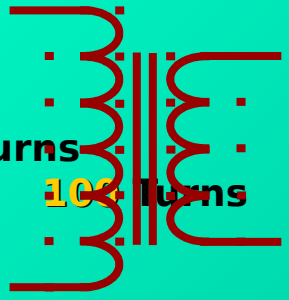


100 Turns

200 Turns

Step UP

2 : 1



200 Turns

100 Turns

Step Down

Trans, E, I & Pwr

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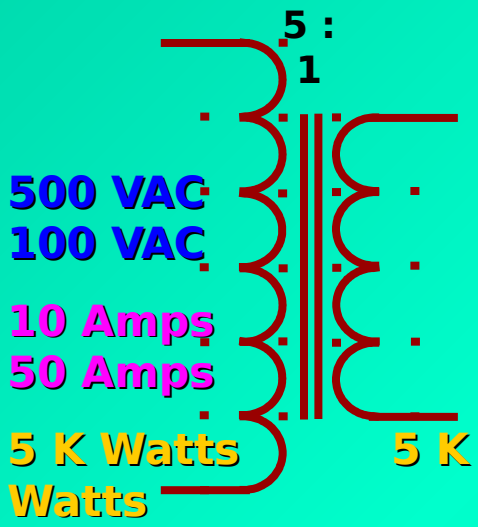
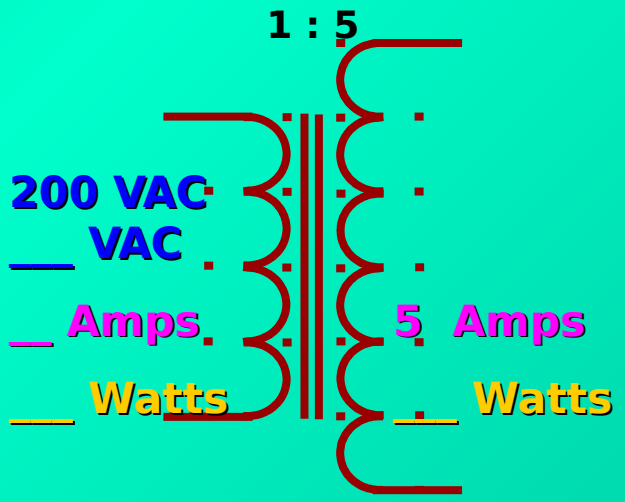
Transformer; Step up Voltage, Step Down Current. & PWR.



Step Down Voltage

Step up Current

Pwr in = Pwr Out



Step UP Voltage

Step Down Current

Pwr in = Pwr Out

Challenge

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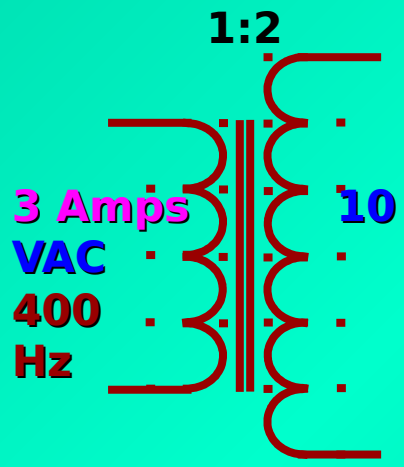
Transformer; **Calculate** Operating Parameters.



Phase; _____

Ratio; _____

E_P; _____

E_S; _____

I_P; _____

I_S; _____

P_P; _____

P_S; _____

S Freq; _____

P Freq; _____

Period; _____

Answers

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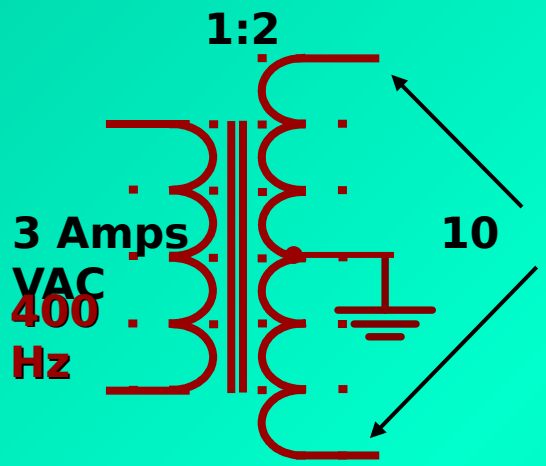
Transformer; Calculated Operating Parameters .



Transformer Efficiency:

$$\frac{\text{Output Power}}{\text{Input Power}} \text{ X 100 = Efficiency \%}$$

Phase;	180° Out
Ratio;	1 : 2
E_P;	5 VAC
E_S;	10 VAC
I_P;	3 Amp
I_S;	1.5 Amps
P_P;	15 Watts
P_S;	15 Watts
S Freq;	400 Hz
P Freq;	400 Hz
Period;	2.5 mSec

Rectifier

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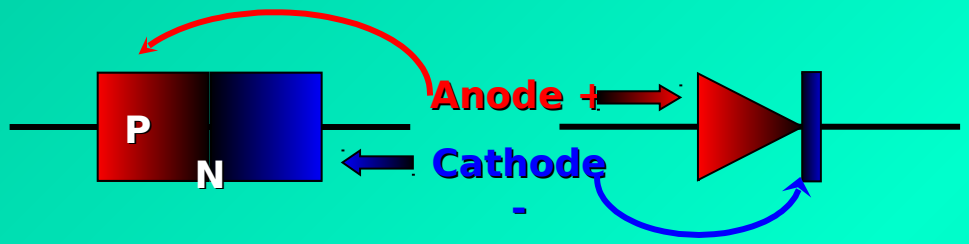
Rectifier; Changes the AC of the Transformer to Pulsating DC.



Diode: 2 Conditions

<u>Forward Bias</u>;

An agreement of the difference of polarity & the polarity of the Material.I is Max, R is Min.

<u>Reverse Bias</u>;

A Disagreement of the difference of polarity & the polarity of the material. R is Max, I is Min

Which of the Diodes are Forward Biased?, Reversed?.

A. 900 mV mV 300

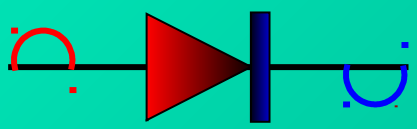
B. 300 mV mV 900

C. 7 VDC VDC 3

D. 900 mV mV 300

E. 3 VDC VDC 12

F.



½ & full Wv

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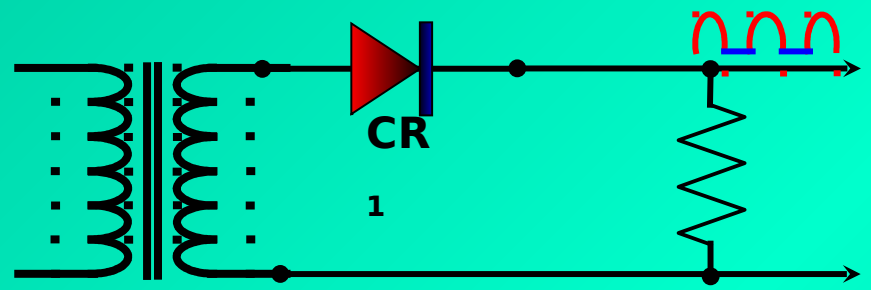
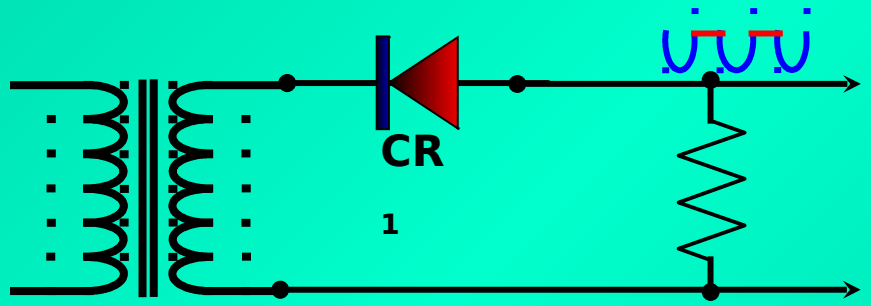
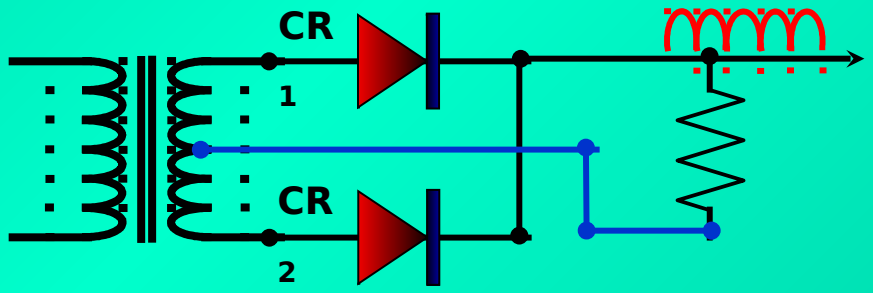
Rectifier; Halfwave & Fullwave.



Halfwave Positive Rectifier



Halfwave Negative Rectifier



Fullwave Positive Rectifier

Bridge Rectifier

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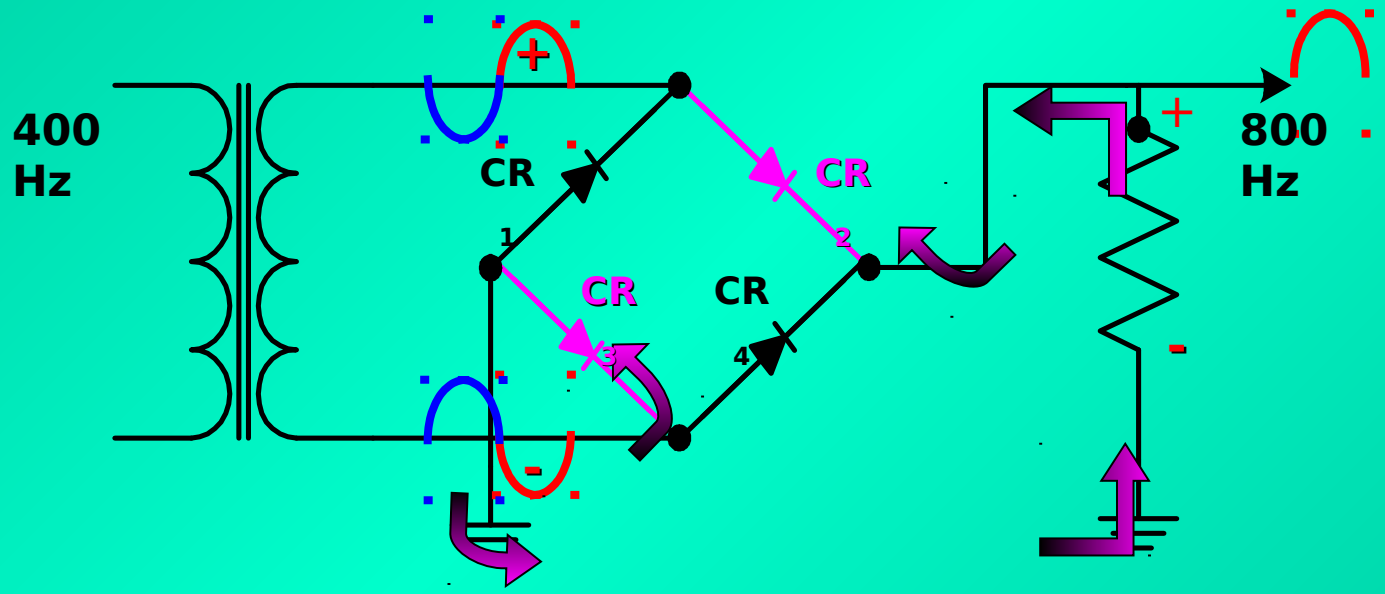
Rectifier; Fullwave Bridge. CR2 & CR3 Conduct.



Convert Peak Voltage to <u>Average DC</u>; Peak X .636 = Avg. DC

CR1 & CR4

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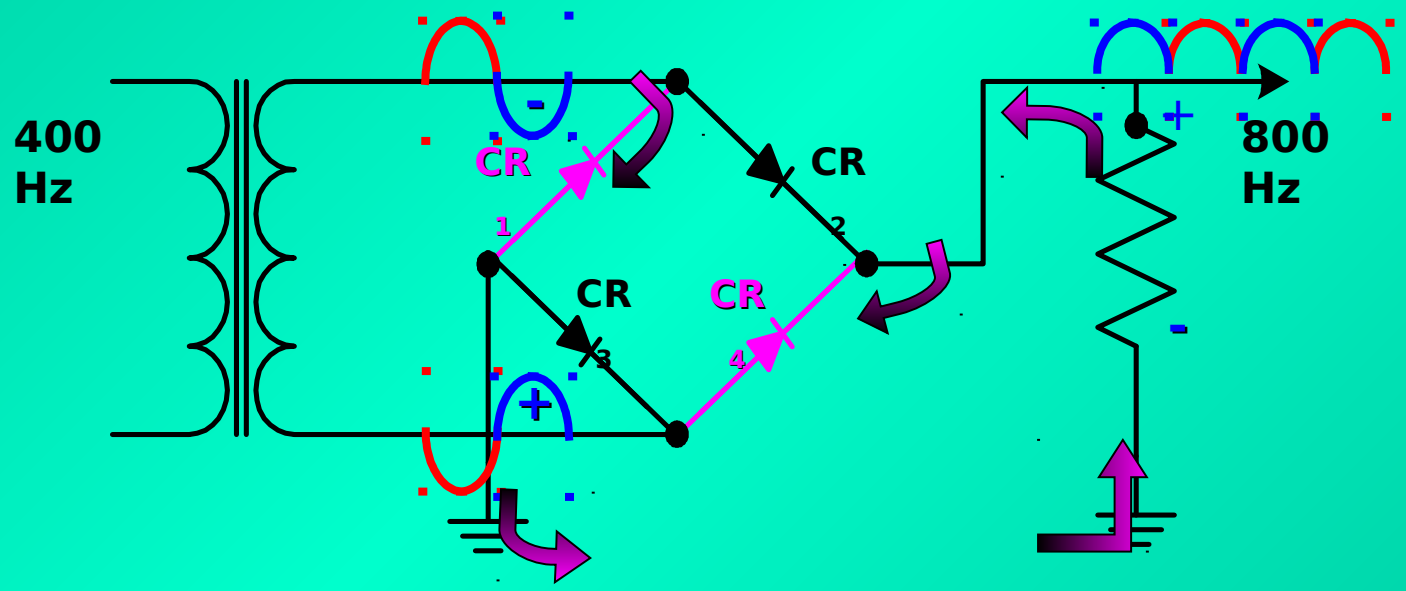
Rectifier; Fullwave Bridge. CR1 & CR4 Conduct.



RC Filter

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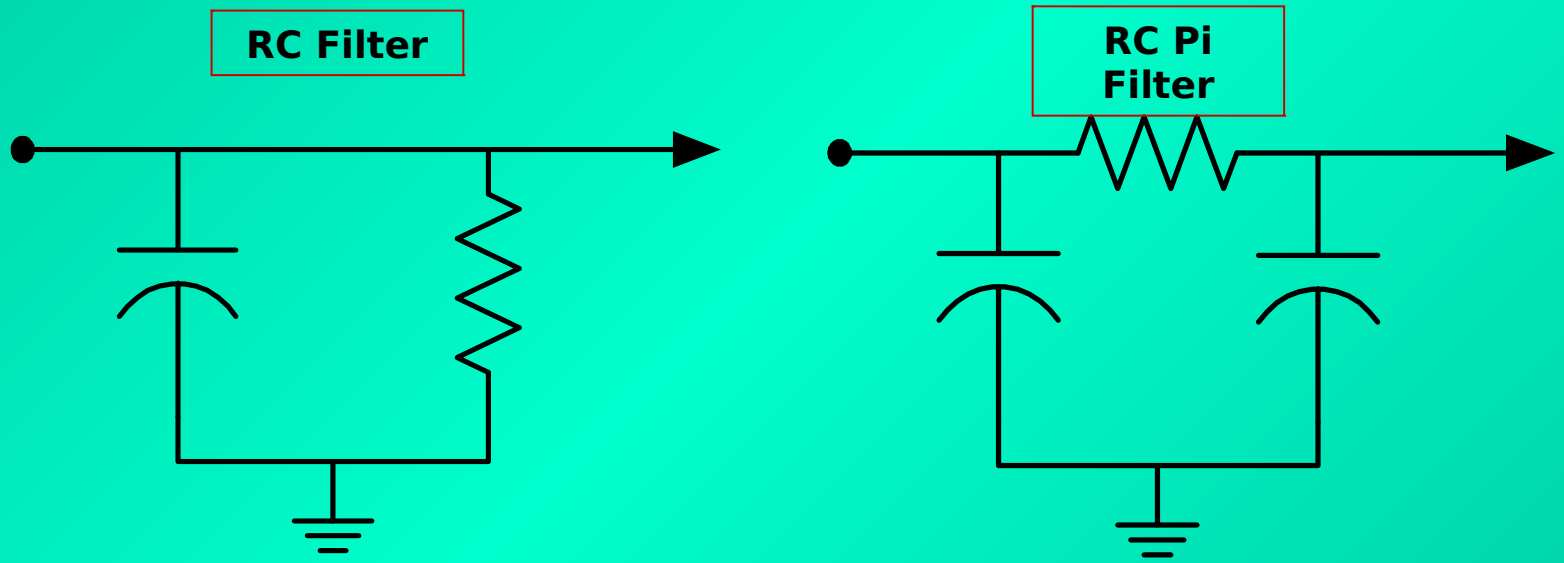
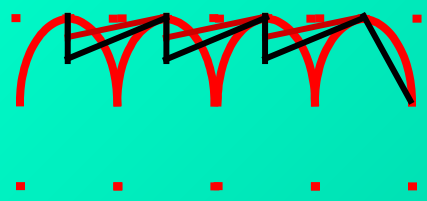
Filter; RC & RC Pi, Capacitive input filters.





LC Filter

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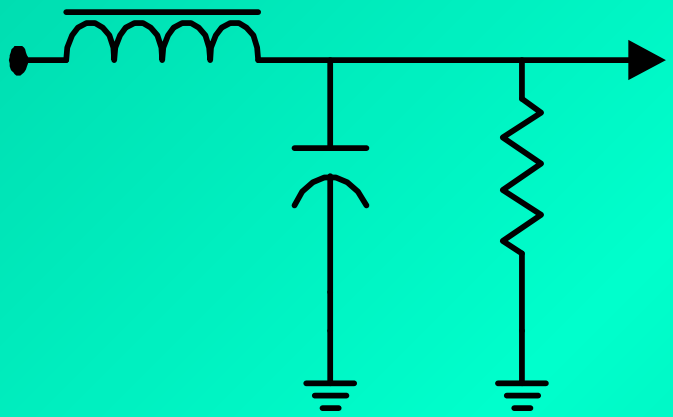
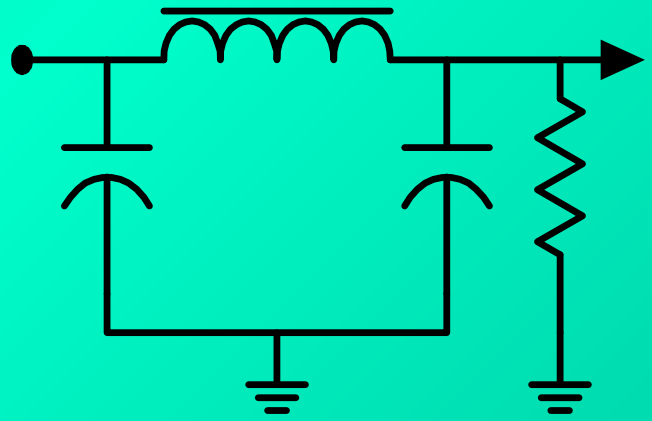
Filter; LC or Inductive Input**, & LC Pi.**





Voltage Doubler

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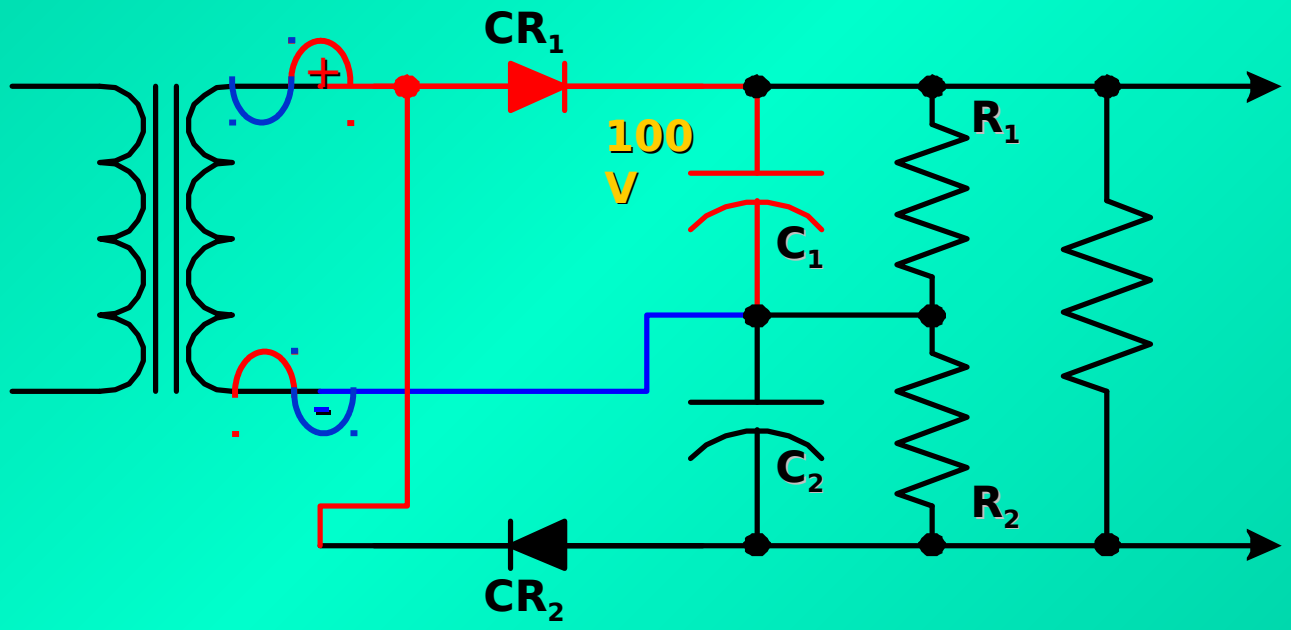
Voltage Doubler; CR1 F-Bias, C1 Charges to 100V, CR2 R-Bias.



Full Wave, Filters, Rectifies & Doubles.

CR2 F-Bias

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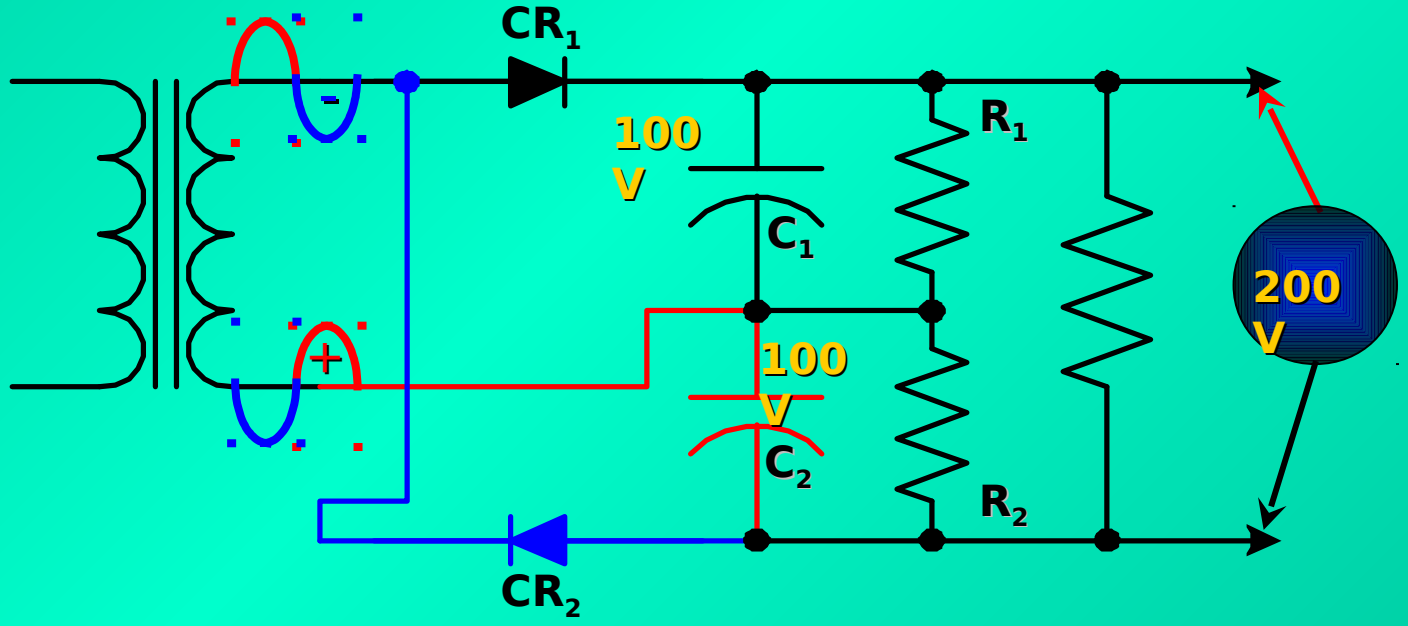
Voltage Doubler; CR2 F-Bias, C2 Charges to 100V, CR1 R-Bias.



Lesson test

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Summary & Lesson Test;

Lesson Test:

Standard: **7 correct answers to 10 Questions within 20 Minutes.**

Reference: **W/O.**